A Dissertation on

Morbidities of Ilio Inguinal Block Dissection and the role of a Tensor Fascia Lata Flap in preventing wound dehiscence

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BONAFIDE CERTIFICATE

This is to Certify that **Dr. Syed Afroze Hussain,** bonafide student of M.Ch. Surgical Oncology. (August 2008 to August 2011) in the Department of Surgical Oncology, Government Royapettah Hospital, Chennai – 600 014 has done this dissertation on "Morbidities of Ilio Inguinal Block Dissection and the role Of Tensor Fascia Lata Flap in preventing wound dehiscence**"** under my guidance and supervision in partial fulfilment of the regulations laid down by The Tamilnadu Dr.M.G.R. Medical University, Chennai for M.Ch. Surgical Oncology Examination to be held in August 2011.

Dr.S.Geethalakhsmi M.D, Ph.D
Dean,
Govt. Kilpauk medical college,
Chennai.

Prof.R.Rajaraman, M.S., M.Ch
Head Of Department
Dept of Surgical Oncology
Govt. Royapettah Hospital
(Kilpauk medical college)

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Introduction

Ilio inguinal block dissections involve the removal of all the nodes in the inguinal region including both the superficial and the deep groups along with the removal of nodes in the pelvis below the bifurcation of the common iliac artery.

When only the inguinal groups of nodes are removed, they are termed inguinal block dissections. Inguinal block dissections may be superficial or inguino-femoral depending on the dissection of deep group of inguinal nodes.

The dissection of these groups of nodes are done as a part of staging procedure in most of the malignancies involving the genital region, lower limb, skin over the anterior abdominal wall below the umbilicus, gluteal region, anal canal and perianal region.

The most important prognostic factors for survival in invasive carcinomas are the presence and the extent of inguinal lymph node metastasis. The survival decreases with increasing number of positive nodes. These dissections may be considered as a curative procedure if only the inguinal nodes are involved, especially in carcinoma of the penis (less than or equal to 2 nodes positive) in various studies. In other

malignancies, positive macroscopic nodal status is an indicator for multi modal management.

Compared to lymphadenectomy in other regions inguinal lymphadenectomy is approached with caution. The surgical oncologist tries to be doubly sure of the benefits before proceeding with this morbid procedure. An over cautious surgeon may jeopardize the staging and a possible cure in these patients.

A simple cytology or a biopsy in the region may prove the presence of disease in a clinically palpable lesion. But in an impalpable scenario a inguinal dissection was the only available resource to prove or disprove the existence of disease in the inguinal nodal basin.

The emergence of sentinel node biopsy has been valuable in evaluating the nodal basin. Of date sentinel node biopsy has been found to be useful in melanoma, and sometimes the sentinel node being found to be the only site of disease. This dilemma has increased the controversy regarding the need for complete lymphadenectomy in these patients.

Until recently, inguinal lymphadenectomy had been associated with a significant morbidity (30-90%) and a mortality of 1-3% in most of the series. Further, previous studies reported up to a 50% false positive rate in patients with clinically enlarged lymph nodes especially in the carcinoma of penis. The complications associated with this surgery necessitate the assessment of the benefits and risks. Skin flap dehiscence, seroma, wound infections, vascular injuries and blow out and DVT are

some of the potential complications. Skin flap dehiscence and wound infections are the most feared ones. They are due to the inguinal dissection with subsequent loss of blood supply to the skin overlying the groin. Older series report up to 30%-50% flap necrosis when primarily closed and modifications are described to reduce the incidence of flap necrosis (Catalona).

To cover large groin defects following inguinal dissections, various flaps have been described. These include a tensor fascia lata (TFL), gracilis, rectus abdominis and a deep inferior epigastric artery myocutaneous flap. The Tensor fascia lata flap is the most commonly used and is the flap used in the present study.

Aim of the study

1) To study the various morbidities associated with Ilio inguinal block dissection.
2) To compare the standard tensor fascia lata flap with a modified extended tensor fascia lata flap.
3) To compare the outcome between primary closure and the two methods of TFL flap design used in the department in reducing the incidence of wound dehiscence.

Materials and Methods

The patients who underwent an inguinal block dissection during 2004-2010 were included in the study and analyzed.

Patient population-

Fifty seven patients in the age group of 18-92 years (median age - 52 years) were operated for ilio inguinal and inguinal block dissection during 2004-2010. A total of 98 block dissections were done. Twenty eight of the patients were male and the rest were females.

The following data was recorded

1) The disease for which groin dissection was done
2) The primary curative procedure
3) Whether the dissection was unilateral or bilateral
4) The type of incision used
5) The type of closure whether primary or flap cover.
6) In bilateral dissections whether the other side had a different method of closure
7) Before closure whether the wound was trimmed and whether a paddle of skin had to be excised over the node
8) Regarding the wound whether the wound healed primarily or dehisced.
9) Whether the wound failure was minor or major.
10) The day the wound dehiscence developed.
11) The time for the wound to heal and the measures taken.

12) The other short term complications.

13) The pathological nodal status.

14) The need for adjuvant therapy.

15) Any delay in starting adjuvant therapy.

16) Radiation treatment breaks after wound healing.

17) Other long term complications.

18) Death within 30 days of surgery and the cause.

Disease details-

The primary malignancy in the patients for whom a nodal dissection has been done is as follows.

Table-1

S.no	Disease	Number of patients
1	Carcinoma penis	19
2	Carcinoma vulva	25
3	Melanoma anal canal	01
4	Melanoma lower limb	03
5	SCC lower limb	07
6	Carcinoma scrotum	01
7	Merkel cell carcinoma foot	01
8	**Total**	**57**

An inguinal block dissection has been done in 54 groins and an ilio inguinal block dissection done in 44 groins. Sixteen patients had unilateral dissection and 41 patients had bilateral dissection. Of all 98 dissections had been done. Fifty six groins wounds were closed primarily and 42 had a TFL flap cover.

Tensor fascia lata flap was used in 13 groin wounds after inguino femoral dissection (carcinoma vulva with inguinal nodes) and 29 groin wounds were closed with the TFL flap after ilio inguinal block dissection. The Standard flap has been used in 21 groin wounds and other 21 groin wounds had an Extended Modified version of the TFL flap.

S.no	Disease	Inguinal	Ilio inguinal	Unilateral	Bilateral
1	Carcinoma penis	8	29	1	18
2	Carcinoma vulva	46	2	2	23
3	Melanoma anal canal	0	1	1	0
4	Melanoma lower limb	0	3	3	0
5	SCC lower limb	0	7	7	0
6	Carcinoma scrotum	0	1	1	0
7	Merkel cell carcinoma foot	0	1	1	0
8	Total	54	44	16	41

Surgical procedure

Five surgical oncologists in the department had operated independently on the patients involved in the study.

Incisions-

1) Single Vertical incisions by a lazy S shape with curved borders but without sharp edges was the most commonly used incision to facilitate pelvic node dissection.

2) Two incisions without cutting the groin crease were used in some patients. The one 3-4cms inferior and parallel to the inguinal ligament of 8-10cms in length over the medial aspect of the thigh is used for inguinal dissection. A separate oblique incision over the iliac fossa facilitates pelvic dissection.

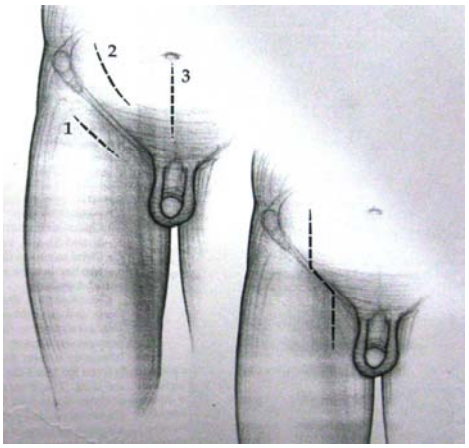
Fig (1) Incisions used in ilio inguinal block dissections

1) Transverse groin crease

2) *Oblique incision over iliac fossa*

3) *Bilateral pelvic dissections*

4) *Lazy s incision*



Procedure

Inguinal dissection-

The skin flaps were developed superiorly and inferiorly using skin hooks. At the junction of superficial Camper's fascia and the membranous Scarpa's fascia the tissues were separated. The skin and the globular fat were elevated from the deeper membranous fascia cephalad to a point 4cms above the inguinal ligament. Dissection was carried down through the Scarpa's fascia onto the external oblique aponeurosis.

The fatty lymph packets were elevated off the external oblique fascia to the inferior border of the inguinal ligament. The medial (medial border of adductor longus) and lateral (lateral border of sartorius) borders of the femoral triangle were defined. The fascia lata was incised over the muscles and the inferior limit of dissection was the confluence at the apex of femoral triangle. The saphenous vein was identified at this point and ligated. The femoral sheath was incised and the femoral vessels exposed. Medial dissection was done to remove the deep inguinal nodes of cloquet lateral to the lacunar ligament.

The femoral sheath was stripped both superiorly and inferiorly and the nodes lying between the vessels were removed by ligating the small vessels. The dissection was completed on removing the superficial and deep lymphatics together.

Sartorius transposition was done especially when not contemplating a flap cover.

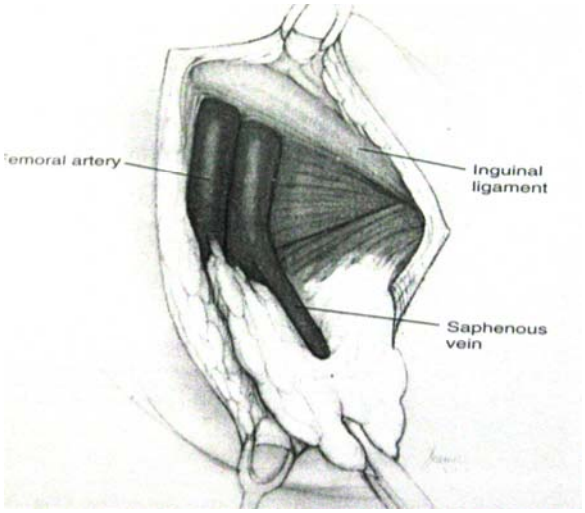


Fig- (2) superior inguinal dissection

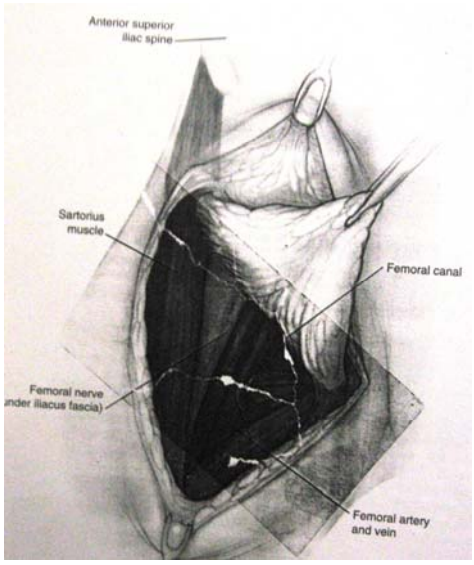


Fig (3) -Inferior inguinal dissection

Pelvic lymphadenectomy-

The external oblique was incised above the groin and the deeper muscles were split to enter the retroperitoneal region. The ureter was

identified and the nodes below the bifurcation of the common iliac vessels medial to the genitofemoral nerve were removed till the deep plane of the obturator nerve. This dissection was joined with the proximal limit of deep inguinal dissection. The femoral ring was closed to prevent herniation.

In patients with viable skin and minimal skin loss, primary closure was done. In patients with larger defects and unviable skin with no bleeding in the skin margin, a TFL flap was used for skin cover.

Two types of flaps were used for the cover

1) Standard TFL musculocutaneous flap
2) Modified extended TFL musculocutaneous flap

Standard Tensor fascia lata musculocutaneous flap (10x20cms) -.

The standard flap used was a vertically oriented flap after marking the anterior, posterior and the distal border of the flap A line drawn vertically from the anterior superior iliac spine (ASIS) to the lateral condyle of the femur marks the anterior boundary of the flap. Using this as the anterior border the flap was designed 8-15cms in width posteriorly. The distal extent of this flap was 20cms below the iliac crest. The pedicle was located 10cms below the ASIS. The flap was raised with the fascia lata until the pedicle was reached (ascending branch of lateral circumflex artery). The anterior arc of rotation was used to cover the defect.

Modified extended tensor fascia lata musculocutaneous flap (15x40cms) –

The extended flap was designed beyond the boundaries as mentioned in the standard flap. The margin of the flap was marked anteriorly at the level of groin defect and the deepened to the deep fascia till the deep muscles.

The flap was elevated and extended into the thigh to about a maximum of 40cms below the ASIS. The posterior boundary can be up to 15cms behind the ASIS. After which the flap with the TFL was raised until the necessary cover was obtained for the anterior rotation of the flap. The flap is also known as the anterolateral thigh flap and though the majority of the blood supply is the ascending branch of the lateral circumflex artery, a part of the flap depends on the random supply based on the other perforators.

Dissection which required a Tensor fascia lata flap

Table-3

Dissection	Inguino femoral	Ilio inguinal
Total Number	13	29

Type of closure done in the each operated groin

Table-4

S.No	Disease	Primary closure	Standard TFL	Extended TFL	Total
1	Carcinoma penis	**17**	**9**	**11**	**37**
2	Carcinoma vulva	**34**	**8**	**6**	**48**
3	Melanoma anal canal	**1**	**0**	**0**	**01**
4	Melanoma lower limb	**1**	**1**	**1**	**03**
5	SCC lower limb	**3**	**2**	**2**	**07**
6	Carcinoma scrotum	**0**	**0**	**1**	**01**
7	Merkel cell ca foot	**0**	**1**	**0**	**01**
8	Total	**56**	**21**	**21**	**98**

Methods commonly employed to prevent complications-

1) Skin flaps were elevated with Campers fascia
2) Edges were trimmed to check the bleeding
3) Skin was approximated with edges everted
4) Tight skin closure was avoided
5) Pre operative antibiotics were given and continued post operatively
6) Sterile dressings were done and wound care given
7) Patient was nursed with hip and knees flexed to avoid tension over the flap region

8) Drain site was cleaned regularly and povidone- iodine applied
9) Seroma was aspirated
10) Thrombo prophylaxis started in bedridden patients

All the patients were nursed with the knee and the hip flexed to relax the skin over the groin. Active limb movements were encouraged as soon as possible. The patients were mobilized as soon as the wound showed signs of healing.

Wound necrosis-

Minor wound necrosis-

A minor wound necrosis was taken as a wound, which had a superficial wound breakdown, healed within 30 days, and did not need additional measures for skin cover.

Major wound necrosis-

A major wound necrosis was taken as a deeper loss of skin, with or without infection and took more than 30 days for healing.

Thus a major wound necrosis delays adjuvant therapy by more than the recommended 6-8 weeks.

Lymph edema

A clinical classification as described by Brunner was used

Grade I-

Edema pits on pressure and swelling largely or completely disappears on elevation and bed rest

Grade II –

Edema does not pit and does not significantly reduce upon elevation.

Grade III –

Edema associated with irreversible skin changes.

Results

A total of 57 patients were analyzed. Ninety-eight nodal dissections were done in the above 57 patients. The most common indication was for carcinoma of the vulva (25/57) followed by carcinoma of the penis (19/57).

The dissections for carcinoma of the vulva were bilateral mostly limited to the inguino femoral group (46/48). The dissections for carcinoma of the penis were mostly bilateral and ilio inguinal.

The other malignancies which required an inguinal block dissection included Squamous cell carcinoma of the lower limb, groin, gluteal region, scrotum (8/57) patients. We had to under take a unilateral ilio inguinal dissection in one patient with melanoma of the anal canal after a wide local excision of the primary after a disease free interval of 1 year. Three cases of melanoma of the lower limb had an ilio inguinal block dissection. The last indication was for a Merkel cell carcinoma of the lower limb. Ilio inguinal dissection was done as a salvage procedure for this patient after radiotherapy.

Type of incision-

A lazy S incision (32 groins) was the most commonly used when planning an ilio inguinal block dissection. Some cases of ilio inguinal block dissections (12 wounds) were operated with double incisions above and below the groin as described.

Wound related complications -

Primary closure wound details –

Fifty-six wounds were primarily closed. One patient with a primary closure died hence one wound could not be assessed. The remaining 55 wounds details are as recorded.

PRIMARY WOUND CLOSURE

Table-5

S.no	Index	Primarily healed	Minor wound	Major wound
1)	Number of wounds	17 (30.36%)	12 (21.43%)	26 (46.42%)
2)	Average days of wound healing	12	25	96

Standard Tensor Fascia Lata Flap cover-

Twenty-one wounds were closed with a standard type of the tensor lata flap. One patient died in the follow up hence two of the wounds could not be assessed. The remaining wound details are as recorded.

STANDARD TENSOR FASCIA LATA FLAP

Table-6

S.no	Index	Primarily healed	Minor wound	Major wound
1)	Number of wounds	17 (81%)	2 (9.5%)	0 (0%)
2)	Average days of wound healing	15	27	nil

Modified Extended Tensor Fascia Lata Flap cover-

Twenty-one wounds were closed with the extended tensor fascia lata flap. One patient died in the seventh postoperative day hence one wound could not be assessed. The remaining 20 wound details are as recorded.

MODIFIED EXTENDED TENSOR FASCIA LATA FLAP-
Table-7

S.no	Index	Primarily healed	Minor wound	Major wound
1)	Number of wounds	9 (42.9%)	7 (33.3%)	4 (19%)
2)	Average days of wound healing	17	28	110

Out of the 57 patients, 12 of them had a combination of wound closure when a bilateral dissection was done. Their records were analyzed.

BILATERAL DISSECTIONS WITH COMBINATION OF WOUND CLOSURE

Table-8

S.No	Type of closure	Bilaterally Healed	Dehiscence in Primary	Dehiscence In Std TFL	Dehiscence Extended TFL	Delay in Adjuvant therapy	Total
1)	Primary with Standard TFL	1	5	1*	-	5	7
2)	Primary with Modified TFL	1	1	-	1*	1	3
3)	Standard TFL with Modified TFL	1	-	-	1*	-	2

(*- minor wound necrosis)

OTHER COMPLICATIONS

Table-9

Complication	Seroma	Lymphedema			Vascular injuries/ Blow out	DVT	Compartment syndrome	Death
		I	II	III				
Number of patients/ total patients	17/57	21/57	13/57	1/57	0/57	2/57	1/57	2/57

Observations and analysis

WOUND RELATED COMPLICATIONS

PRIMARY CLOSURE-

Primary closure had a high rate of wound related complications. Major wound dehiscence was associated with infection, which further complicated wound healing. Of the 56 dissections primarily closed, only 17 (30.36%) healed without complications.

Twelve wounds developed minor wound dehiscence (21.43%). In the remaining 27 dissections, one patient died and the remaining 26 wounds had major wound dehiscence for which the average healing period was 95.5 days. Hence adjuvant radiotherapy was delayed in the above 26 dissections (46.42%) performed.

STANDARD TENSOR FASCIA LATA FLAP-

The standard tensor fascia lata flap had the best outcome with only one wound related complication that was minor in nature. This wound healed within 30 days with regular wound dressing. An additional grafting or flap cover was not required.

MODIFIED EXTENDED TENSOR FASCIA LATA FLAP-

In the wounds which had a modified version of a tensor fascia lata flap 4 (19%) had major wound dehiscence which healed with average

duration of 110 days and they required additional methods like split skin grafting for healing.

Seven of them (33.3%) had minor wound dehiscence. The site of minor wound dehiscence when these flaps were applied was in the medial margin and commonly in the lower most distal part. Nine of the wounds (42.9%) healed without any complications.

BILATERAL DISSECTIONS WITH A COMBINATION OF WOUND CLOSURE-

In patients who had a bilateral dissection, the advantage of using a tensor fascia lata flap was not achieved when the contralateral side was closed primarily. Of the 10 patients who had a combination of tensor fascia lata flap and primary closure, only two patients healed primarily and received adjuvant therapy without delay.

Six patients (60%) developed major wound dehiscence in the wounds primarily closed. The remaining 2 patients (20%) had minor wound complications in the tensor fascia lata flaps. One of the wound had a standard Tensor Fascia Lata flap and the other a modified Tensor Fascia Lata flap.

The wounds of these patients healed with secondary intention within 30 days. There was no delay attributable to tensor fascia lata flap in the above two patients receiving adjuvant radiotherapy.

Two patients were closed with a combination of extended tensor fascia lata and a standard tensor fascia lata. Only minor necrosis was seen and the wounds healed without major complications and there was no delay in starting adjuvant therapy.

OTHER COMPLICATIONS

SEROMA

Seventeen of the patients presented with seroma for repeated aspiration that ranged from 20- 45 days. The figure could have been higher because some of the wounds were dehisced. Continuous discharge from these wounds needed regular change of dressings.

VASCULAR COMPLICATIONS

None of the operated patients developed vascular blowouts. This could have been a major problem in the study looking into the fact that most of the wounds primarily closed had major wound infections. The regular use of Sartorius to cover the femoral vessels avoided this catastrophic event.

One patient developed compartment syndrome after the standard TFL flap was used to cover the wound. Another patient developed deep vein thrombosis.

LYMPHEDEMA

The most distressing long-term complication noted was lymphedema. Varying grade of lymphedema was noted in 35/57 (61.4%) patients. Only one patient presenting on long-term follow up had grade III lymphedema. The progress of this patient was complicated with associated cellulitis. She had to be admitted for management on two occasions for treatment with antibiotics and supportive care. Grade I lymphedema was seen in 21/57 (36.8%) patients. Grade II lymphedema was noted in 13/57 (22.8%) patients. They were advised manual lymphatic drainage and compression stockings.

DEATH

Two deaths were recorded in the present analysis. Both the deaths were due to vascular complications. One patient died in the seventh postoperative day due to deep venous thrombosis and associated pulmonary embolism. The other patient developed a compartment syndrome in the leg in the third postoperative day. This complication was noted in the lower limb in which a standard type of tensor fascia lata was raised and the resultant defect was primarily closed. The postoperative period of this patient was associated with renal failure and septicemia, which later culminated in Multi Organ Dysfunction Syndrome. This patient died in the 12^{th} postoperative day.

Management of wound complications

As soon as the wound necrosis is noted, the sutures are removed and the necrosed skin flaps were excised until fresh bleeding was obtained. Wound swabs were taken and a third generation cephalosporin was started and modified with culture report.

The wound was irrigated daily with eusol solution and saline dressings were applied. Most of the minor wounds complications healed with the above measures in 1-2 weeks. The major wound took a longer time to granulate to an average of 5-6 weeks.

The wounds were complicated with infections and lymph discharge. The combination of above delayed the development of healthy granulation tissue. Regular change of dressing was needed in these patients.

It was only when the lymph discharge reduced the wound started healing. Fortunately, all the wounds healed with the above measures. Split thickness skin graft was applied after the development of healthy granulation tissue in the case of large wounds.

Vascular blow outs were not seen in any of the patients though infection and wound necrosis were high in primary wound closure. All the patients had Sartorius transposition. This is the reason for absence of this dreaded complication with high fatality rate in this study.

Compartment syndrome was seen in one patient as described above. The primarily closed donor site sutures were removed. The wound was decompressed and anti edema measures with mannitol was started. Mannitol was used to prevent the development of Acute Renal Failure. The patient's condition was complicated due to old age (84 years) and associated infection.

Discussion and Review of Literature

Surgical Anatomy

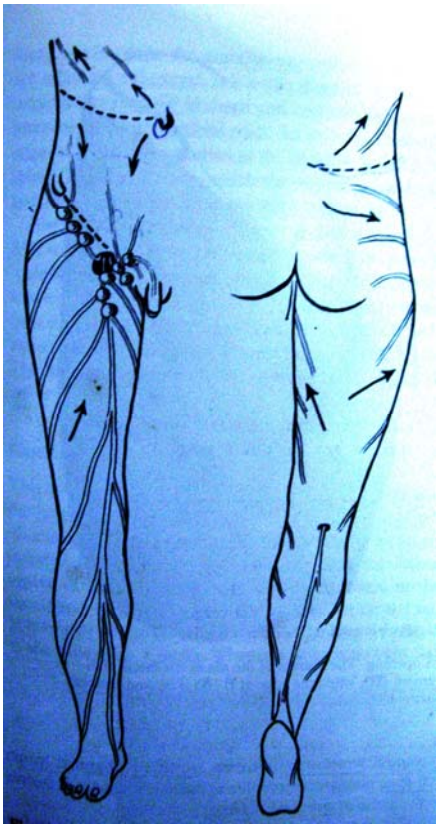
Lymphatic drainage

Large lymphatic vessels accompany the great saphenous vein from the foot, leg and the thigh. Numerous large vessels also spiral around the outer side of the thigh to converge on the superficial inguinal nodes. These consist of up to 20 nodes arranged in an irregular T shaped pattern in the subcutaneous fat of the femoral triangle. Inspection of the dissected nodes shows no obvious arrangement into groups yet they are rightly described as belonging to three groups, for they drain three distinct areas.

The vertical group lying lateral to the termination of the great saphenous vein receives lymphatic from the deep fascia (and everything superficial to it) of the lower limb. The lateral groups of nodes lying below the lateral aspect of the inguinal ligament receive lymph from the buttock, flank and the back below the waist. The medial groups of nodes lie below the medial end of the inguinal ligament and a node or two may encroach on the anterior abdominal wall. They receive lymph from below the umbilicus and medial to a line drawn vertically upwards from the anterior superior iliac spine. More importantly the medial groups receive lymph also from the perineum, lower part of the anal canal and the external

genitalia in both the sexes. All of these nodes lie below the superficial fascia of Camper.

Fig- ( ) Superficial lymph nodes receive all the lymph from below the waist



The efferent lymphatics from all the three groups converge towards the saphenous opening and pass through the cribriform fascia to enter the three or four deep inguinal nodes, lying medial to the femoral vein. Their passage through the fascia covering the saphenous opening produces a number of holes which give rise to the sieve like appearance denoted by the same name cribriform.

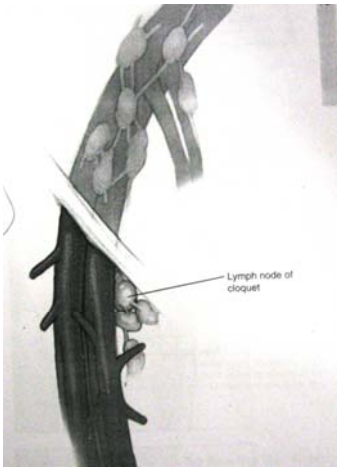


Fig ( ) Femoral node of cloquet

Extensive work by Daseler et al on inguinal lymph node dissection suggests five groups' node groups in the superficial inguinal area.

1) Central nodes at the sapheno femoral junction
2) Superolateral nodes around the superficial circumflex vein
3) Inferolateral around the lateral cutaneous and the superficial circumflex veins
4) Superomedial around the superficial external pudendal and the superficial epigastric veins
5) Inferomedial around the great saphenous vein

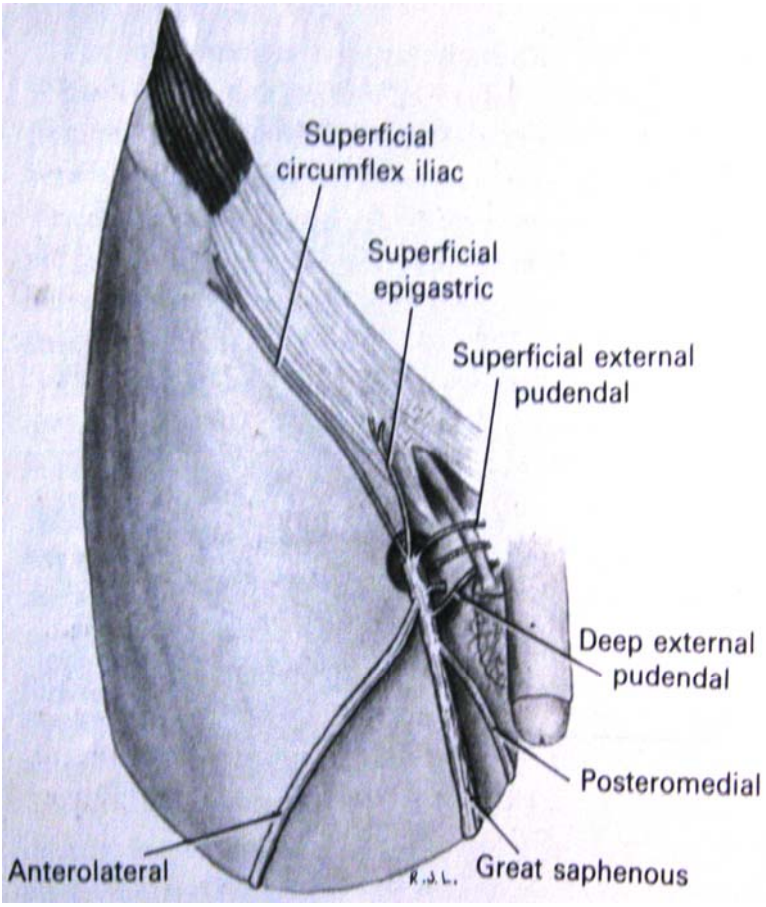
The deep inguinal nodes lie deep to the fascia lata and medial to the femoral vein. They receive deep lymphatic's accompanying the femoral vessels, from the glans penis (clitoris) and a few efferent lymphatic's from the superficial group of nodes.

The most cephalad node is the Cloquets node, which is located between the femoral vein and the lacunar ligament.

The inguinal group of nodes finally drains into the external iliac nodes.

Blood supply to the skin of the groin

Superficial blood vessels in the groin



Blood supply to the inguinal skin derives from the superficial branches of the femoral artery i.e. Superficial external pudendal, superficial circumflex iliac, superficial epigastric arteries. These arteries are ligated in inguinal lymphadenectomy. Hence, the skin flap viability

depends on the anastomosing vessels within the superficial fascia of Camper, which track from lateral to the medial side along the skin lines, parallel to the inguinal ligament.

Radical inguinal lymhadenectomy-

The dissection margins for radical inguinal lymhadenectomy cover the area outlined superiorly by a line drawn from the superior margin of the external inguinal ring to the anterior superior iliac spine (ASIS), medially by a line drawn from the pubic tubercle 15cms down the medial thigh, and laterally by a line drawn from the ASIS extending 20cms inferiorly. A line drawn between the inferior end of the lateral and the medial margins marks the inferior limit of the dissection.

Modified inguinal block dissection-

Catalona (1988) originally proposed a complete modified inguinal dissection. This involves a smaller skin incision, limited field of dissection, preservation of the saphenous vein, and thicker skin flaps. This technique also avoids the having to transpose the Sartorius muscle to cover the exposed femoral vessels. Unlike in the superficial dissections, the deep nodes in the fossa ovalis are also removed. When properly performed various studies confirm the value of this technique (Parra 1996, Colberg et al 1997).

In this technique, skin flaps are raised in the same manner as for the radical inguinal lymphadenectomy. Cephalad dissection on to the external oblique and the medial extension of the dissection are identical. The lateral dissection is more limited in the sense that after opening the femoral sheath, dissection lateral to the femoral artery is not performed, sartorius is not exposed and dissection inferiorly extends only to the caudal edge of the fossa ovalis.

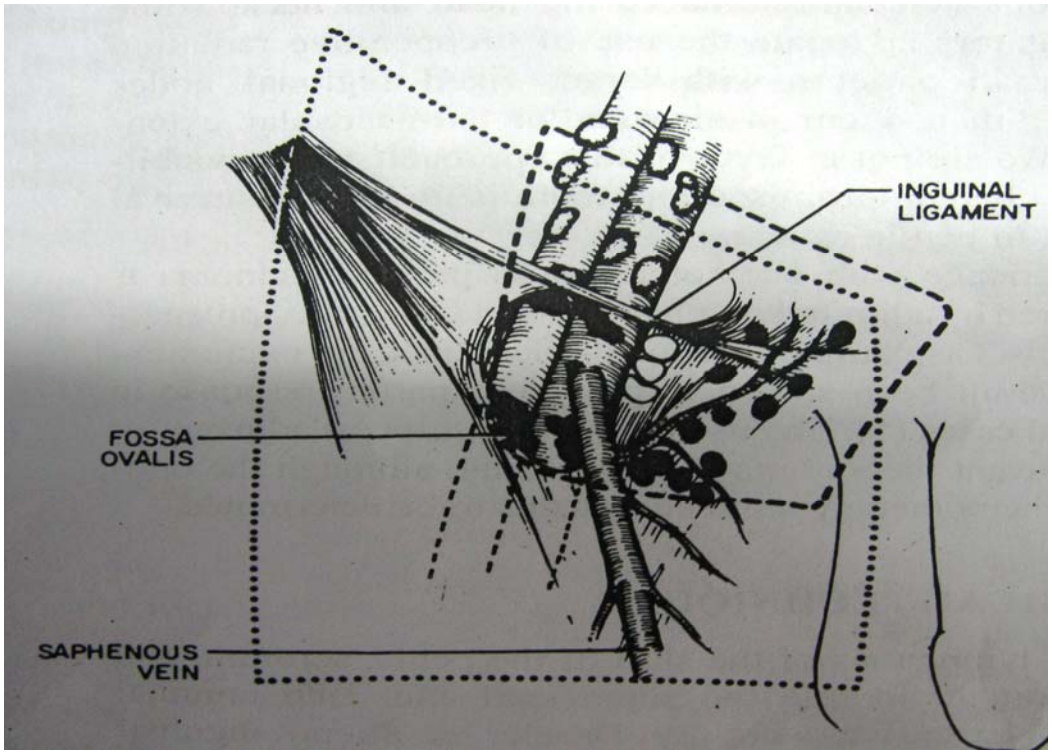


Fig ( ) Comparing the limits of dissection of modified inguinal with classic radical groin dissections

The rationale for the modification has been revealed by detailed lymphangiographic studies. These studies have revealed no

evidence of direct pelvic node drainage (i.e bypassing the inguinal nodes) from the external genitalia (Riveros et al, 1967)

The advantages of the limited dissections include

1) More information is provided than by biopsy of a single node or a group of nodes
2) The possibility of not identifying the sentinel node is limited by removal of all the potential first echelon nodes
3) Morbidity is minimal compared with standard lymphadenectomy

Complications of Ilio inguinal block dissections

Adverse events following ilio inguinal block dissections can be divided into short term and long term. In short term complications, the most commonly reported is the wound infection and wound necrosis. Wound infection can be minor or major with infection of the seroma followed by abscess formation and wound dehiscence. Large open wounds can be managed conservatively with application of EUSOL and daily dressings. Fortunately, most of these wounds heal within a period of 3-6 weeks with above measures.

Deep venous thrombosis has to be suspected in all patients with a swollen limb following an inguinal dissection. Hand held Doppler has to be done at the bedside. The development of pulmonary embolism can be catastrophic with sudden death in early post operative period.

The most universal and troubling long term complication of groin dissection is lymphedema. Most of the patients after an inguinal dissection develop some degree of lymphatic stasis in the lower limb. This can range from mild to severe and disabling.

Significant lymphedema is often predicted by the amount of lymphatic drainage retrieved by post operative suction drains. Identified risk factors for lymphedema consistently include patient obesity and older age, and less consistently include operative factors such as thin skin, transverse incisions, sacrifice of the saphenous vein or the muscle fascia and the transposition of the Sartorius muscle.

The incidence and the severity of lymphedema is increased if radiation is added as a adjuvant treatment. Although the techniques of omental transposition have been proposed, unfortunately to date there is no proven prophylactic strategy to reduce the incidence or the severity of lymphedema.

Management of lymph edema ranges from simple maneuvers like leg elevation and compression stockings to more aggressive regimens like sequential pump therapy and manual massage. Patients who develop chronic lymphedema are more susceptible to cellulitis, presumably because of impaired lymphatic clearance of the bacteria.

Wound reconstruction

Successful reconstructive surgery is measured in terms of safe defect coverage with simultaneous restoration of form and function and avoidance of donor site deformity. To achieve the optimal result the surgeon must complete the three important reconstructive evaluations: (1) defect analysis with subsequent definition of the reconstructive requirements, (2) evaluation of potential sources of tissue in regard to suitability for defect coverage or reconstruction, and (3) utilization of technical data to successfully reconstruct the defect.

Major advances in flap design following the initial identification of the cutaneous territories of muscle/ musculocutaneous and fascia and fasciocutaneous flaps have resulted in numerous flap modifications. The most important modification involves tissue expansion, which permits the use of regional tissue adjacent to the defect or more efficient design of distant flaps for transposition or micro vascular reconstruction.

Each flap has a standard arc of rotation that allows transposition for defect coverage and /or reconstruction. Flap transposition is restricted in applicability by the arc of rotation. The flap must reach the defect without excessive stretch to avoid the risk of vascular pedicle injury.

Surgical options in reconstruction

1) Skin grafts- divided into split thickness graft and full thickness graft depending on the depth of skin elevation
2) Random pattern flaps – This is based on the adjacent subdermal vascular plexus. It is a flap without a defined cutaneous vascular territory. This was initially developed with a length width ration in the range of 2-1.5:1. But the dimensions of the random flap can vary widely from individual to individual and body site to site. . Limitations of the random flap are the arc of rotation, proximity to the wound and associated zone of injury and decreased bacterial resistance.
3) Axial pattern flap- Axial flap has a defined vessel in the base of the flap. These are specific vascular territories based of direct cutaneous vascular pedicle with and axial alignment of the flap based on the course of the superficial vascular pedicle. There are three types of axial flaps. The direct cuticular axial flap is a flap based on the vessel superficial to the superficial layer of the body wall fascia. The classic example is the groin flap. A musculocutaneous flap is on the other hand based on the vascularity of the muscle. The overlying skin paddle is carried on the perforators. The fascioscutaneous system has its blood supply carried on the fascia, and the overlying skin paddle is based on the perforators..

Flap classification

A classification system provides the framework for decision making in reconstructive surgery. A flap is generally classified according to its

component parts, vascular anatomy and size. These three parameters are the basis for flaps selection. Both the muscle and the fascial flaps are classified according to their vascular anatomy.

Musculocutaneous vascular classification

The muscle circulation is based on the vascular pedicle or the pedicles that enter the muscle belly between its origin and insertion. The pedicle consists of an artery, a branch of a major vessel to the specific anatomic region of the muscle, and paired venae comitantes that drain into a corresponding regional vein. Each human muscle has a fairly constant pattern of circulation.

All or a part of the muscle can be transferred as a flap provided that circulation is not interrupted during surgical manipulation of the muscle. A precise understanding of the vascular anatomy of the muscle is necessary to assess the the relative comntribution of the each vascular pedicle to the muscle circulation. Use of the muscle as a flap is generally based on its dominant vascular pedicle. Division of the dominant pedicle results in the vascular necrosis of the muscle.

Type 1- these flaps are based on single vascular pedicl;e.

Eg- tensor fascia fascia lata flap, gastrocnemius,

Type 2- depends of both dominant and minor vascular pedicles

Eg- sternocleidomastoid, platysma, gracilis

Type 3- depends on two dominant pedicles

Eg- gluteus maximus, pectoralis minor, rectus abdomis, temporalis

Type 4- depends on segmental vascular pedicles

Eg- sartorius,

Type 5- depends on single dominant vascular pedicle and secondary segemental vascular pedicles

Eg- pectoralis major, latissimus dorsi.

Fascio cutaneous vascular classification

The circulation of the deep fascia is based on the vascular pedicles that enter its deep surface and forma vascular network to the fascia and subsequently to the overlying subcutaneous tissue and the skin.

Type A- direct cutaneous- vascular pedicle emerges from a regional source and courses in a radial fashion which is relatively superficial.

Eg- forehead flap, temporoparietal fascia, groin flap, sural artery

Type B – septocutaneous or intermuscular – vascular pedicles are brabches of mnajor limb vessels and course through intermuscular septae or between adjacent muscles

Eg- anterolateral thigh flaps, deltoid, scapular, peroneal artery

Type C- musculocutaneous- larger musculocutaneous perforator's form the vascular pedicle.

Eg- deltopectoral, anterolateral thigh, nasolabial

Classification of the flap based on the elevation technique

1) Peninsular flap- flap in which the vascular continuity and the cutaneous continuity of the flap base are left intact.

2) Island flap- flap in which the vascular continuity is maintained, however the cutaneous continuity is divided
3) Microvascular free transfer (free flap) - this flap has both the vascular and cutaneous continuity interrupted. The vascular continuity is then re-established in the recipient site.

Reconstruction after inguinal lymphadenectomy

Large groin defects may be created after inguinal lymphadenectomy for bulky metastatic disease in the groin. Many types of flaps have been described and advocated to cover the large defects in the groin, when extensive dissections are required. The goal is to provide muscle bulk to protect the femoral vessels and full thickness skin for wound coverage. This will allow for the least morbidity post operatively and the least likelihood of femoral vessel rupture should adjuvant radiotherapy be required.

Flaps described to accomplish this purpose have included a tensor fascia lata myocutaneous flap, a gracilis myocutaneous flap, an abdominal rotation flap, a rectus abdominis myocutaneous flap, a deep inferior epigastric artery myoocutaneous flap, a thigh rotational skin flap, and a scrotal advancement flap

Tensor fascia lata -

This flat muscle is located laterally on the upper thigh. It is a thick , short muscle lies at the junction of the gluteal region and the upper part of the front of the thigh. It is enclosed between the layers of the ilio tibial tract and extends through the ilio tibial tract of the fascia lata to the lateral aspect of the knee. The muscle originates from the outer lip of the anterior superior iliac spine and inserts in the ilio tibial tract 3-5cms below the level of the greater trochanter.

Nerve supply- Superior gluteal nerve

Actions- It flexes and medially rotates the hip joint, and extends the knee through the iliotibial tract.

The flap has a type 1 pattern of circulation.

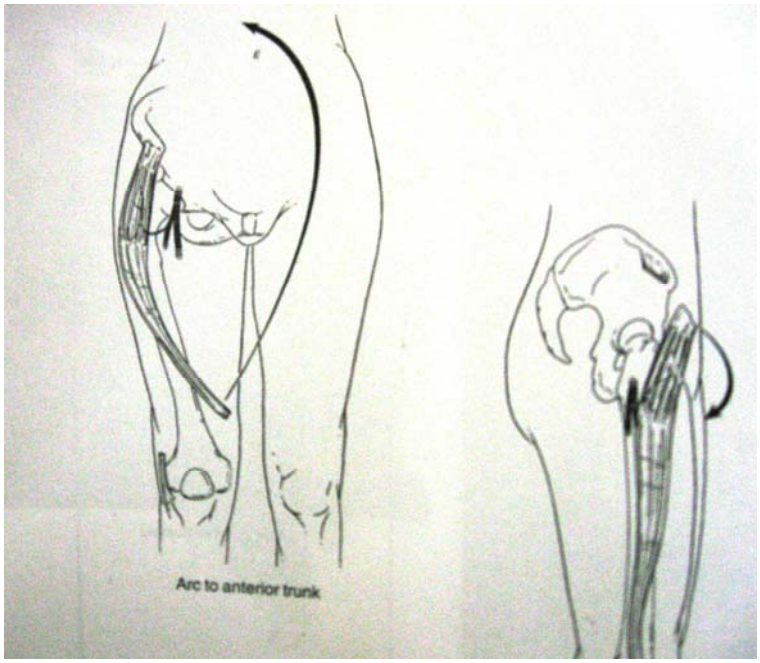
Vascularity- The dominant pedicle is the ascending branch of lateral circumflex femoral artery and the venae comitantes. The lateral circumflex artery arises from the profunda femoris artery and courses deep to the rectus femoris and the Sartorius muscles. The ascending division of this vessel supplies the TFL, gluteus maximus and vastus lateralis. This division enters the muscle deep on the medial aspect at a point 10cms below the anterior superior iliac spine. The blood supply of the upper portion of the lateral thigh is derived from the musculo cutaneous perforators of this vessel.

Ilio tibial tract- this is a thick band of fascia lata running vertically on the lateral side of the thigh from the iliac crest to the lateral condyle of the

tibia. The tensor fascia lata is inserted into the front and the gluteus maximus behind. These muscles help to steady the pelvis on the thigh and through the tract keep the knee joint firmly extended in the erect posture. The anterior part of the tract splits to enclose the tensor fascia lata

Tensor fascia lata flap

Fig- ( ) - Tensor fascia lata flap arc of rotation to cover the inguinal wound



The tensor fascia lata flap can used to cover the abdomen, groin and the perineum and the trochanter, ischium and the sacrum. The flap can also be used to reconstruct the abdominal wall, vulva, and the inguinal

hernia. As a free flap, it can be used to cover the regions of the head and the neck, upper extremity, lower extremity and the foot.

The disadvantage of the TFL flap is the unsightly dog-ears at the lateral edge of the wound and the necessity to cover the donor areas with a split skin graft.

Rifaat MA et al from the Cairo university in there study have concluded that the tensor fascia lata flap is a reliable and a versatile flap, with minimal donor site morbidity. Problems with the flap's vascularity of its distal part should not be encountered, if the flap is harvested within the safe limits and properly designed and the edges comfortably inserted to the defect. A pedicled flap would be appropriate for lower abdominal wall defects, and is better islanded to achieve extra mobilization and allow a tension free closure, while for groin defects, simple flap transposition should be enough. Nevertheless, reconstruction for full thickness abdominal wall defects by this flap is a static reconstruction. They therefore strongly recommended enforcing the repair with a synthetic mesh primarily to minimize the incidence of ventral hernia.

The tensor fascia lata as a free flap in abdominal-wall reconstruction.

Williams JK at al in their study on the pedicled tensor fascia lata flap (TFL flap) as a method of choice for abdominal-wall reconstruction found the size and location of the defect for this option. Microsurgical transfer was

tried to overcome these disadvantages. They evaluated the ability of TFL free flap to reconstruct complex abdominal wounds. Seven patients with full-thickness abdominal-wall defects were reconstructed by TFL free flaps. Their average age was 44.6 years (range: 27 years to 59 years); follow-up averaged 10.5 months (range: 2 months to 18 months). Fifty-seven percent of the wounds were either infected or contaminated; the defect averaged 15 cm x 26 cm Six 85.7 percent) of the wounds involved the epigastrum. No total flap loss was seen, but three flaps developed distal tip necrosis (42.9%). Microsurgical transfer of the TFL free flap was found to overcome the limitations of the arc of rotation seen with the pedicled flap. It increases the vascularity of the distal portion of the flap. The TFL free flap is therefore an option in abdominal wounds, particularly those with defects of large size.

Other flaps used in the prevention of wound complications-

Many types of flaps have been described other than the tensor fascia lata flap to cover large defects of the groin following ilio inguinal block dissections. The flaps used in the reconstruction are as follows

1) The TRAM flap- the use of the rectus abdominis leads to abdominal weakness.
2) Abdominal rotation flap
3) Deep inferior epigastric artery (DIEA) myocutaneous flap
4) Rectus Femoris – weakness of knee extension

5) Sartorius muscle flaps- Sartorius has a segmental blood supply (Type IV) and thin muscle belly, which is not suitable in many of the cases for the type of defect we need to cover

6) Gracilis- skin availability is limited in the gracilis flap

Since Song et al. reported the use of Anterolateral thigh flap (ALT flap) in 1984; this flap has been widely used in reconstructive procedures. After the initial reports of anatomic description and clinical applications of ALT flap from Asian countries, this flap gained popularity. This can be raised as an ultra thin perforator flap, thin fasciocutaneous flap, thick myocutaneous flap or may be combined with other flaps of the region to suit the requirements.

Cunha Gomes et al have described a pedicled anterolateral thigh flap. It was an island flap based on a perforator. It was found to be a durable local flap option for large skin and soft tissue defects caused by inguinal block dissections.

Review of various studies –

Vascular anatomy of tensor fascia lata

Hubmer MG et al in pioneering study have described the detailed vascular anatomy of the tensor fascia lata perforator flap. The background of this study was to differentiate between musculocutaneous and septocutaneous perforators of the tensor fasciae latae perforator flap

and to evaluate their number, size, and location and to provide landmarks to facilitate flap dissection.

The authors could show that the numbers of septocutaneous perforators for the tensor fasciae latae flap are constant and that their diameter was greater than that of musculocutaneous perforators. The location of these perforators on a line extending from the ilium to the greater trochanter facilitates the planning and dissection of this flap.

Nahai et al have described the tensor fascia lata musculocutaneous flaps anatomical and vascular basis in 21 patients together with its application. The tensor fascia lata (TFL) muscle has been described together with the overlying skin of the anterolateral thigh to make a reliable musculocutaneous unit.

It was found to be lengthened safely by taking the fascia lata and the skin of the anterolateral mid and lower thigh to within 8 cm of the knee. The skin of the longer flap was supplied by large perforating musculocutaneous arteries and the terminal branches of the vascular pedicle of the muscle.

Kaohsiung Hsien et al have described alternative choices to facilitate a successful reconstruction when no sizable skin perforators are encountered in anterolateral thigh (ALT) flap dissection.

The above papers show that the tensor fascia lata flap is versatile. The standard flap as in our study has it blood supply based on

the ascending branch of the lateral circumflex artery. The large musculo-cutaneous perforators from the vessels supply the overlying skin.

The modified flap also depends mostly on the ascending branch of the lateral circumflex femoral artery; in addition the flap depends on the terminal branches of the pedicle. The larger skin area taken anteriorly is similar as the anterolateral thigh flap. The anterior part of the flap depends on a random supply as there are no sizable perforators. The present study has also shown that this flap developed wound breakdown in the lower anterior aspect.

Studies related to morbidities of inguinal and ilio inguinal block dissections

The morbidity of inguinal lymphadenectomy was analyzed by Ravi et al in 1993. These included wound infection in 18%, skin edge necrosis in 61%, seroma formation in 5% of dissections, and lymph edema in 25% of limbs. Pre-operative radiation to the groin significantly increased the healing complications. The routine use of a myocutaneous flap for primary reconstruction of the groin following ilio-inguinal lymphadenectomy resulted in 100% primary wound healing and significantly reduced the post-operative hospital stay to a mean of 10 days in the above study.

Baas et al reported morbidity of Groin dissection in 151 consecutive patients from 1970 to 1984. One hundred forty-three patients (95%) underwent an ilioinguinal node dissection, while eight (5%) were treated with an inguinal node dissection.

In 88 patients, the groin dissection was combined with isolated regional perfusion. Primary wound closure was performed in 140 patients (93%). There was no 30-day postoperative mortality. Complications included temporary seroma (26 [17%] of 151 patients), wound infection (14 patients [9%]), wound necrosis (five patients [3%]), and edema (30 patients [20%]). They found that the morbidity of groin dissection did not increase when the groin dissection was combined with isolated regional perfusion.

Andrew.spillane et al aimed to objectively define the criteria for assessing the presence of lymphedema and to report the prevalence of lymphedema after inguinal and ilio-inguinal (inguinal and pelvic) lymph node dissection for metastatic melanoma. An overall 14% had lymphedema in their study.

A whole limb perimeter volume percentage change of more than 14% and increase in the sum of circumferences of the defined points along the limb of more than 6% provided a robust definition of lower limb lymphedema.

Discussion of the results.-

The wound is the most common cause of morbidity associated with the ilio inguinal block dissections. The wounds which have been primarily closed were associated with most of the wound disruptions. Around 46% of the wounds primarily closed had a major wound breakdown. Further these wounds were complicated with infections. The length of the hospital stay in these patients was also increased. Additionally continuous discharge of the lymph from the wounds necessitated repeated dressings due to wound soakage. The average duration of wound healing was around 95.5 days (50-156 days) in the patients who had a major wound necrosis. In contrast minor wound related complication was seen in around 21% of the wounds. The average duration of wound healing in minor wounds was around 24 days (21-28 days). Only around 30% of wounds healed primarily when closed without a flap cover.

In the study, the standard tensor fascia lata flap healed without any major wound related complications. When all the wound were compared the standard tensor fascia lata flap had the best outcome. Only two patients had minor wound complications and they healed within 30 days. The modified tensor fascia lata flap had the second best outcome. Most of the wound complications in the extended flap were minor. The wound in these flaps necrosed predictably in the lower and the outer most part of the flap.

An important observation made when bilateral dissections are performed and wounds closed by using different types of flaps (primary,

standard and modified tensor fascia lata) was the advantage gained by one wound healing was lost when the other wound dehisced. The advantage of a healed wound is starting adjuvant radiotherapy at the earliest for highest chance of cure. Six out of the 12 such operated patients had a delay in starting adjuvant therapy. In all the six patients, the wound closed primarily was the cause of major wound necrosis. Thus the benefit of using a flap not seen when combined with primary closure on the contra-lateral side.

To reduce the wound complications the patient's position was maintained in the flexed position with pillows in our study. As the stretch on the wound results in increased tension to the suture line.

RECENT DEVELOPMENTS-

DYNAMIC SENTINAL NODE BIOPSY-

Despite its beginning in the treatment of penile cancer more than 30 years ago, its application in penile cancer remains highly controversial. The fundamental issue is that the lymphadenectomy is not just a staging procedure but has a clear survival benefits in carcinoma penis.

The clear advantage of DSNB strategy is the lower morbidity at the cost of increased false negative rates. False negative rates of up to 18-25% have previously been reported.

Innovations such as using DSNB with ultrasound guided fine needle aspiration have reduced the false negative rate to 7%. While these results are impressive, the occurrence of a false negative is very serious and difficult to salvage.

It is imperative that patients be made aware of the importance of regular follow up and self-examination due to the possibility of false negative findings. In all other circumstances, a superficial or modified inguinal dissection should be standard. This procedure is applied to melanoma of lower limb to identify the sentinel node and proceed with inguinal dissection.

LAPAROSCOPIC INGUINAL LYMPHADENECTOMY-

South American investigators have described two approaches in penile cancers namely Video Endoscopic Inguinal Lymphadenectomy (VEIL) and Endoscopic Inguinal Lymph Node Dissection for Penile Cancers (EPLC).

The laparoscopic approach to the inguinal region offers the potential for removing all the inguinal lymph nodes at risk for the disease while minimizing the complications. This approach while promising will require further validation with larger patient numbers and longer follow up.

Conclusion

Nodal dissections in the inguinal region are not to be taken lightly. Wound breakdown and necrosis is the worst of all its complications. Tensor fascia lata flap are recommended to prevent wound necrosis. The study proves the above hypothesis when the standard form of the flap is used for reconstruction. The modified form is easier to apply and may cover a larger area but the medial part of the flap has a precarious supply and prone for necrosis. We recommend a flap delay when the modification is planned.

Primary closure of the wound may sometimes heal without any complications. When wound necrosis develops there is delay in starting adjuvant therapy which may have adverse impact on the survival. Radiation treatment breaks due to radiation dermatitis have been found to be associated with patients who had flap necrosis.

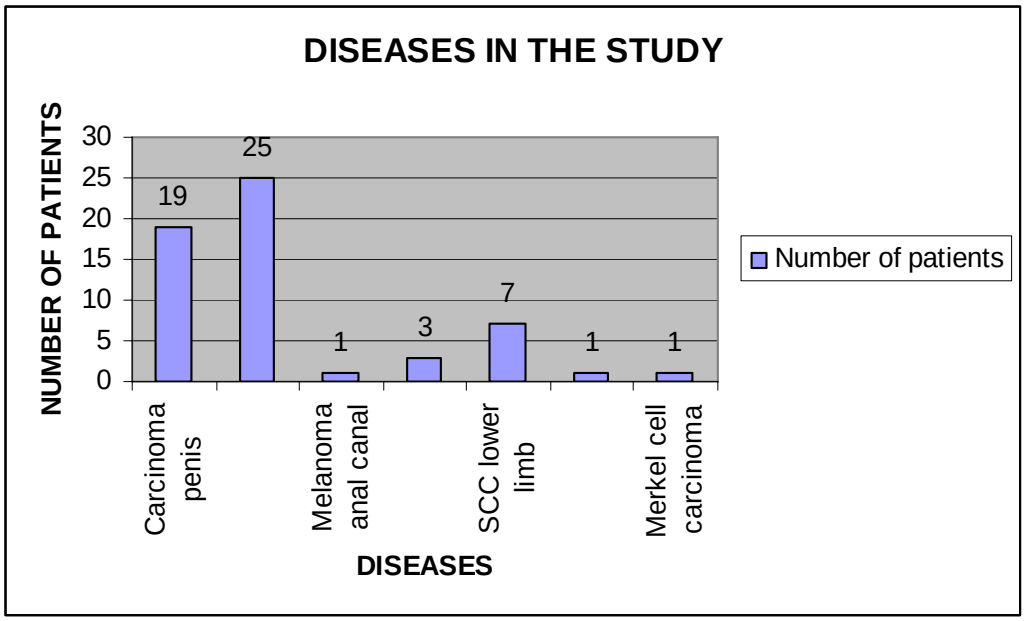
The standard tensor fascia lata flap has the best outcome followed by the modified extended tensor fascia lata flap. The worst outcome was seen in the wounds closed primarily. The necrosed wounds healed without further complication in all the cases with conservative measures. Some of the healed wounds had to be covered with split skin grafts.

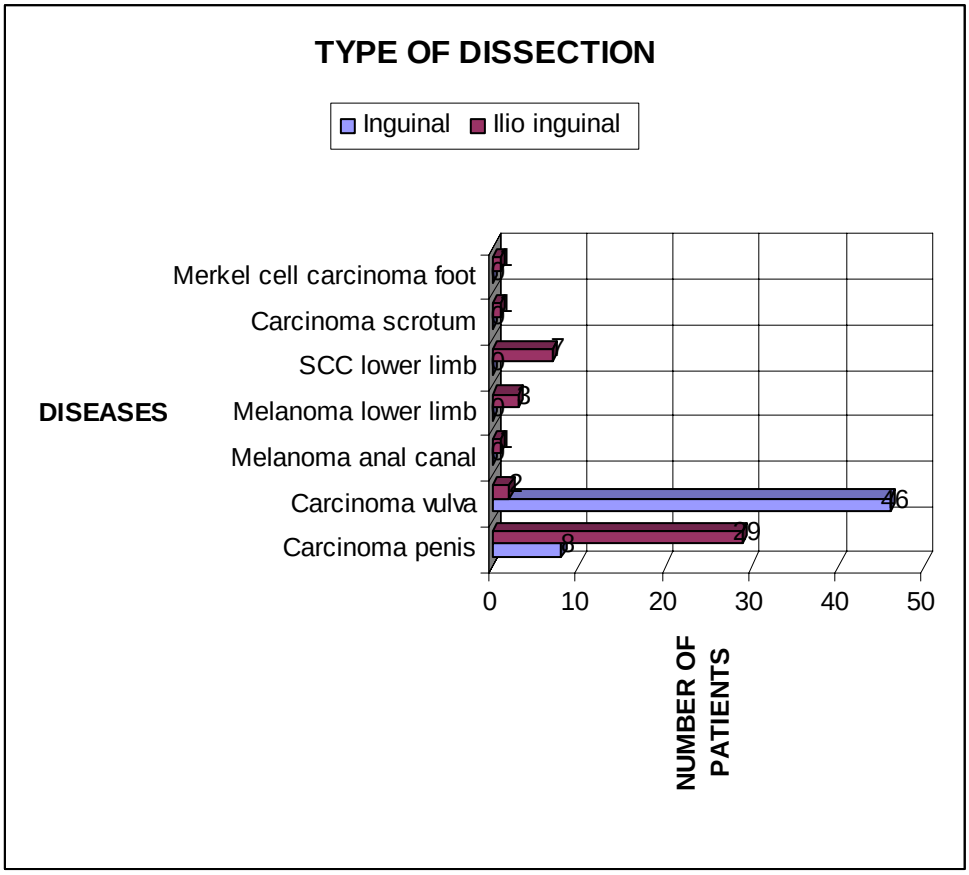
The benefit of a tensor fascia lata flap is related to early wound healing. Adjuvant therapy can be started once the wound has healed. The

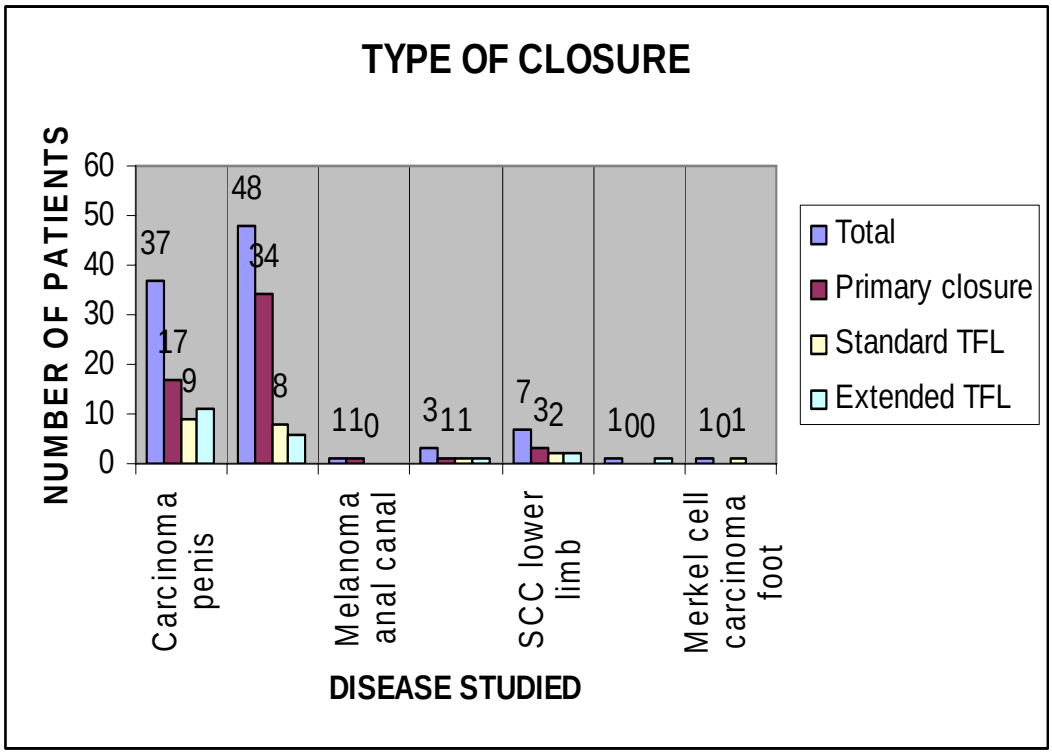
recommendation is to start adjuvant therapy within 6-8 weeks. However, some of patients with bilateral dissections were found to have one wound closed with TFL flap and the contralateral wound primarily closed. In these patients though the TFL healed primarily, the contralateral wound dehisced leading to delay in starting adjuvant therapy. Hence, the study recommends bilateral TFL flap cover.

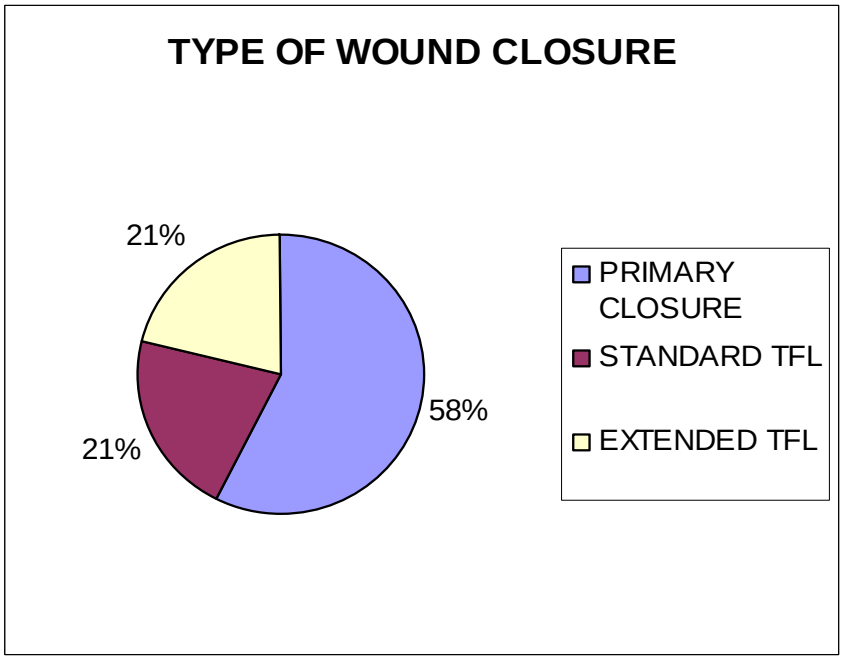
Sartorius transposition is recommended especially when planning a primary closure to prevent a vascular blow out. Lymph edema was the commonest long-term complication. Grade 1 lymph edema was the most prevalent and the patients were managed conservatively. The third common complication was seroma. Most of the collections were treated with regular aspiration. Lymph discharge when complicated with wound necrosis and infection leads to delay in wound healing. Hence, it is vital to prevent wound necrosis in the first instance so that the wound heals with out complications.

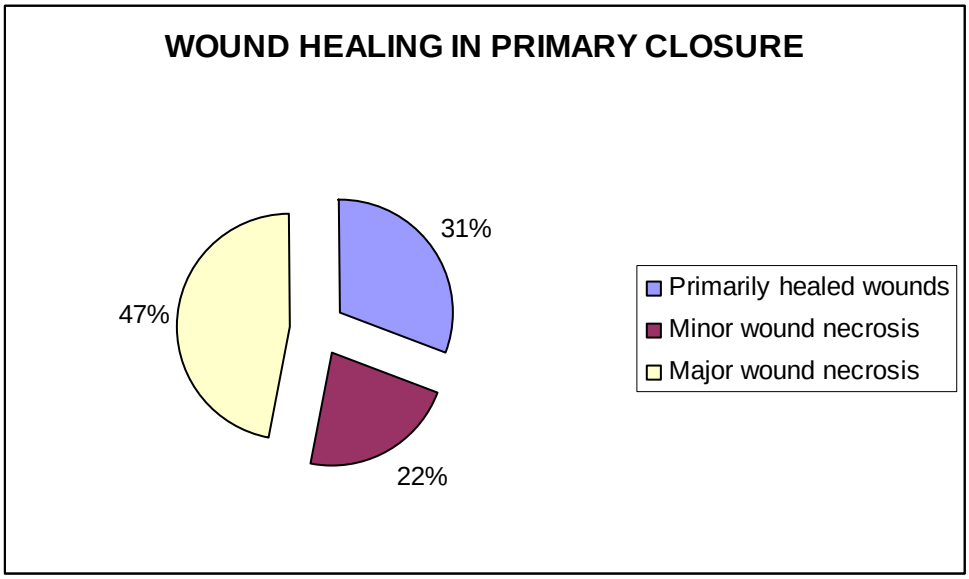
Thrombo-embolism and compartment syndrome were found to be the cause of immediate postoperative period death. Thrombo prophylaxis are recommended in all these patients to prevent deep venous thrombosis

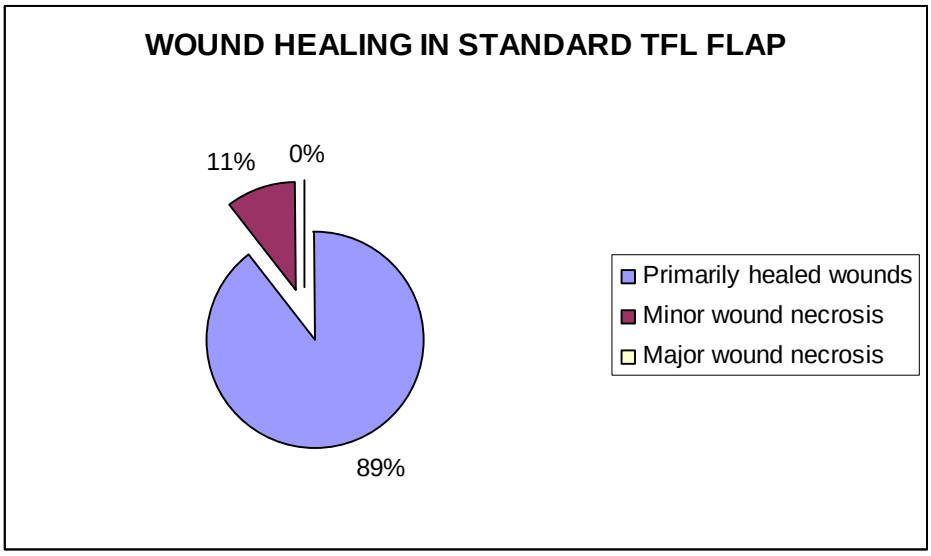

DISEASES IN THE STUDY
NUMBER OF PATIENTS
30
25
20
15
10
5
0
19
25
1
3
7
1
1
Carcinoma penis
Melanoma anal canal
SCC lower limb
Merkel cell carcinoma
DISEASES
Number of patients

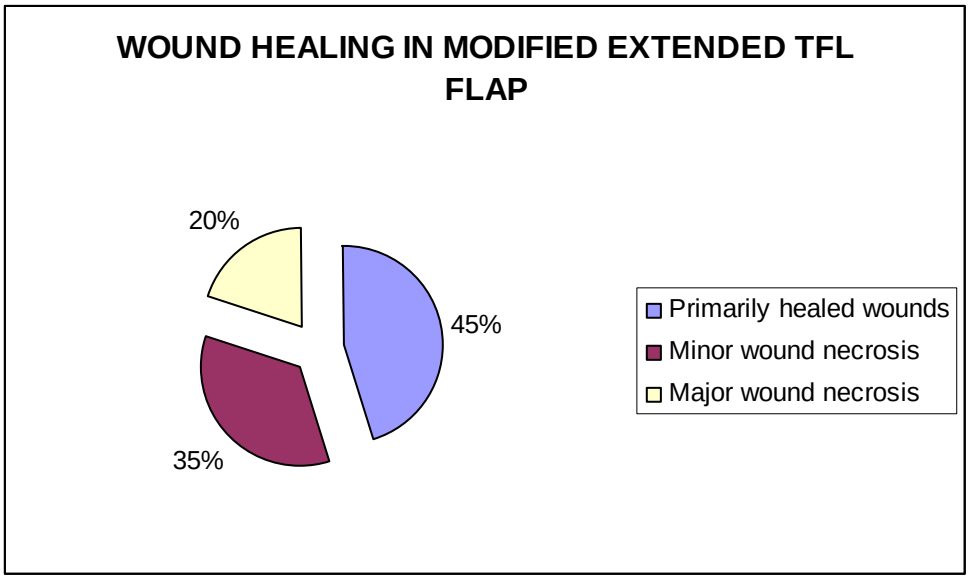

TYPE OF DISSECTION
Inguinal
Ilio inguinal
Merkel cell carcinoma foot
Carcinoma scrotum
SCC lower limb
Melanoma lower limb
Melanoma anal canal
Carcinoma vulva
Carcinoma penis
DISEASES
0
10
20
30
40
50
NUMBER OF PATIENTS

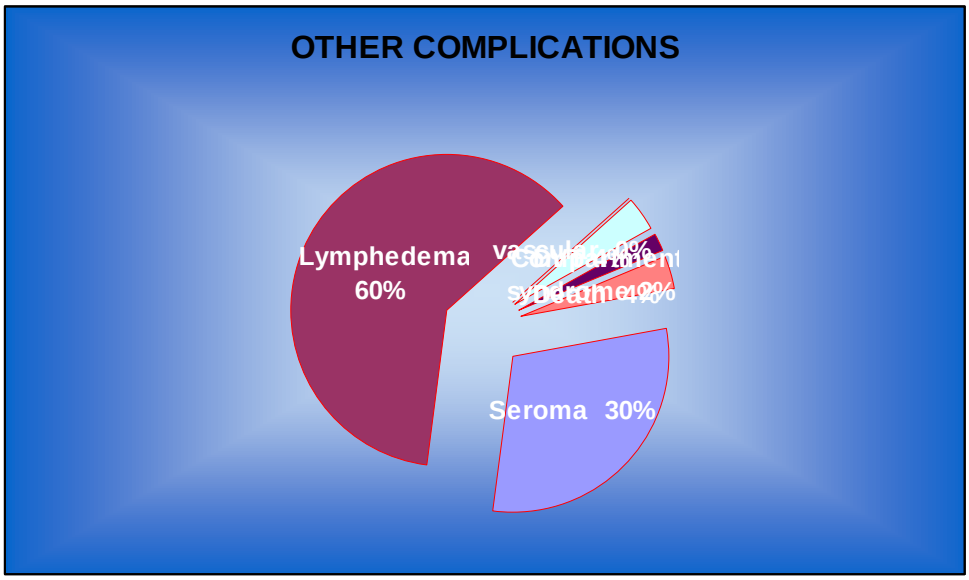

TYPE OF CLOSURE
NUMBER OF PATIENTS
60
50
40
30
20
10
0
37
17
9
48
34
8
1 1 0
3 1 1
7
3 2
1 0 0
1 0 1
Carcinoma penis
Melanoma anal canal
SCC lower limb
Merkel cell carcinoma foot
DISEASE STUDIED
Total
Primary closure
Standard TFL
Extended TFL


TYPE OF WOUND CLOSURE
21%
58%
21%
PRIMARY CLOSURE
STANDARD TFL
EXTENDED TFL


WOUND HEALING IN PRIMARY CLOSURE
31%
47%
22%
Primarily healed wounds
Minor wound necrosis
Major wound necrosis


WOUND HEALING IN STANDARD TFL FLAP
11%
0%
89%
Primarily healed wounds
Minor wound necrosis
Major wound necrosis


WOUND HEALING IN MODIFIED EXTENDED TFL FLAP
20%
45%
35%
Primarily healed wounds
Minor wound necrosis
Major wound necrosis


OTHER COMPLICATIONS
Lymphedema 60%
Seroma 30%

Name	Age/Sex	CD No	Disease	Surgery	Dissection	Bil/Uni
jayaraman	60/m	948/07	ca penis	partial pen	ilio inguinal	bilateral
koteeswar	48/m	874/07	ca penis	emasculati	ilio inguinal	bilateral
krishnanan	59/m	353/07	ca penis	emasculati	ilio inguinal	bilateral
ethirajam	62/m	826/04	ca vulva	MRV	Inguinal	bilateral
anthony	50/m	222/04	ca penis	emasculati	ilio inguinal	bilateral
mangai	60/f	80/04	melanoma rt h	wide excisi	ilio inguinal	unilateral
anjalai	27/f	527/04	ca vulva	MRV	ilioInguinal	bilateral
subramani	70/m	1448/08	ca penis	partial pen	Ilio inguinal	bilateral
rajendran	37/m	1126/07	ca penis	emasculati	ilio inguinal	bilateral
parvathy	50/f	705/06	marjolins rt thi	wide excisi	ilio inguinal	unilateral
saraswathy	58/f	738/06	scc r foot	amputatior	ilio inguinal	unilateral
tamilarasi	35/f	1026/06	ca vulva	MRV	Inguinal	bilateral
venugopal	53/f	805/09	ca penis	emasculati	ilio inguinal	bilateral
angamuthu	50/m	1473/08	ca scrotum	wide excisi	ilio inguinal	bilateral

Incision	if bilateral other side	skin	wound complication
lazy s	bil modified TFL	padc	necrosis medial margin major bil
lazy s	bil modified TFL	padc	necrosis medial margin major bil
trans	bil modified TFL	padc	minor medial merginal necrosis lt, rt hea
lazy s	RT ETFL, LT primary	padc	NA
lt transverse RT lazy S	RT ETFL, LT primary	padc	lt healed, rt marginal necrosis minor
lazy s	*NA*	padc	healed
lazy s	bil ETFL	padc	healed
lazy s	rt primary, lt ETFL	padc	rt wound necrosis lt minor marginal med
rt lazy s,lt transverse	rt etfl, lt stfl	padc	rt marginal necrosis minor, lt healthy
transverse	nil	padc	medial merginal necrosis minor
lazy s	*NA*	padc	nil
lazy s	bil modified TFL	padc	nil
lazy s	bil modified TFL	padc	nil
lazy s	bil modified TFL	padc	medial marginal necrosis bil minor

management	wound cover	post op H	adjuvar	healing time		delay in adjuv		cause of delay
wound debridement	secondary int	node pos	RT	120 days		150 days		wound infection
wound debridement	SSG	node pos	RT	55 days		80 days		wound infection
wound care	secondary int	node pos	RT	25 days		70 days		wound necrosis
NA	NA	NA	NA	NA		NA		NA
wound debridement	RT secondar	node pos	RT		28		60	wound necrosis
nil	primary	node pos	RT	12 days			25	nil
nil	primary	node pos	rt		13		25	nil
wound debridement	secondary int	node pos	RT	LT-27,rt-124		yes1 year		wound infection
minor dressing	rt secy, lt prin	node neg	salvage	rt-22,lt-15		na		na
minor dressing	secondary int	node pos	RT		25		90	
nil	primary	node pos	RT		15		30	nil
nil	primary	node pos	RT		15		36	nil
nil	primary	node pos	salvage		15	na		nil
minor dressing	primary	node pos	RT		29	nil		nil

reaction to RT	complication	complicatic	complicatic	post op de	last follow
moist reaction after 22GY				nil	3/3/2008
moist reaction after 30GY				nil	7/15/2007
completed 50 gy RT	grade 1 lymphedema			nil	########
NA	na	DVT died 4		NA	
nil	na	seroma-16		na	########
nil	nil	nil			
nil	nil	nil			7/27/2005
na	grade 1 lymphedema	seroma-20		yes	########
na	nil				12/8/2008
nil	grade 1 lymphedema	nil			5/31/2006
nil	nil	nil		no	########
nil	grade 1 lymphedema	nil		nil	########
na	grade 1 lymphedema	loss of sensation		nil	4/10/2010
nil	nil	nil	nil	nil	24-7-2009

disease status
PD- paraortic
defaulted

died of PE 4 pod
unknown
defaulted
defaulted
ned
PD- paraortic
ned
ned
ned
ned
ned

Name	Age/Sex	CD No	Disease	Surgery	Dissection	Bil/Uni
Therasammal	73/F	891/10	Ca Vulva	M.R.V	inguinal	bilateral
Kalia perumal	63/m	436/10	SCC foot	amputation	Ilio inguinal	unilateral
Thenammal	50/F	454/10	ca vulva	M.R.V	inguinal	bilateral
Nirmala	55/f	783/10	Ca Vulva	M.R.V	inguinal	bilateral
Ramasamy	70/m	887/10	ca penis	emasculation	ilio inguinal	bilateral
damayanthi	60/f	503/10	Ca Vulva	M.R.V	inguinal	bilateral
venkatasubran	45/m		ca penis	partial penectomy	inguinal	bilateral
Savithri	61/f	1145/08	Ca Vulva	M.R.V	inguinal	bilateral
Chinnammal	55/f	555/07	Ca Vulva	M.R.V	inguinal	bilateral
Muniamma	65/F	1885/08	Ca Vulva	M.R.V	inguinal	bilateral
Kaladevi	45/f	1217/08	Ca Vulva	M.R.V	inguinal	bilateral
Pappammal	50/f	61/08	Ca Vulva	M.R.V	inguinal	bilateral
ignesiya	92/f	1714/07	Ca Vulva	M.R.V	inguinal	bilateral
tamilarasi	48/f	1506/07	ca vulva	M.R.V	inguinal	bilateral
kural murasu	37/m	1012/10	ca penis	emasculation	ilio inguinal	bilateral
sundaram	59/m	154/10	ca penis	emasculation	ilio inguinal	bilateral
mallika	40/f	296/04	ca vulva	m.r.v	Ilio inguinal	bilateral
ramu	70/m	614/04	ca penis	emasculation	Ilio inguinal	bilateral
subramani	70/m	123/08	ca penis	partial penectomy	Ilio inguinal	bilateral
mangammal	60/f	141/06	ca vulva	hemivulvectomy	inguinal	unilateral
loganathan	55/m	906/06	ca penis	emasculation	Ilio inguinal	bilateral
balu	46/m	1067/06	ca penis	emasculation	Ilio inguinal	bilateral
narayanan	58/m	1231/10	scc leg	amputation	Ilio inguinal	unilateral
velankanni	45/f	163/10	ca vulva	hemivulvectomy	inguinal	unilateral
rangasami	50/m	906/07	melanoma	wide excision	Ilio inguinal	unilateral
jayachandran	54/m	1843/07	melanoma	wide excision	Ilio inguinal	unilateral
palani	55/m	544/06	scc foot r	amputation	Ilio inguinal	unilateral
anila	23/f	956/09	Ca Vulva	M.R.V	inguinal	bilateral
jayamma	60/f	850/09	Ca Vulva	M.R.V	inguinal	bilateral
gangammal	65/f	364/09	Ca Vulva	M.R.V	inguinal	bilateral
mary	58/f	14/09	Ca Vulva	M.R.V	inguinal	bilateral
rajalakshmi	30/f	539/04	ca vulva	M.R.V	inguinal	bilateral
munusamy	33/m	1467/04	ca penis	partial penectomy	inguinal	bilateral
ethirajam	62/m	826/04	ca vulva	MRV	Inguinal	bilateral
anthony	50/m	222/04	ca penis	emasculation	ilio inguinal	bilateral
subramani	70/m	1448/08	ca penis	partial penectomy	Ilio inguinal	bilateral

Incision	if bilateral other side	skin excision	wound complication
transverse groin	primary	trimming	bil marginal necrosis minor
lazy s	NA	paddle	flap necrosis/infection major
transverse groin	primary	trimming	nil
transverse groin	primary	trimming	nil
transverse groin	RT TFL/ LT primary	trimming	wound necrosis LT minor
transverse groin	primary	trimming	nil
transverse groin	primary	trimming	wound necrosis both/infection major
transverse groin	primary	trimming	wound necrosis both/infection major
transverse groin	primary	trimming	wound necrosis minor
transverse groin	primary	trimming	wound necrosis/infection major
transverse groin	primary	trimming	nil
transverse groin	primary	trimming	wound necrosis /infection bila major
transverse groin	primary	trimming	marginal necrosis minor
transverse	LT TFL,RT primary	paddle LT, rt	rt wound necrosis major lt healed
transverse	RT TFL, LT primary	paddle	lt wound dehiscence major,rt healed
transverse	RT TFL, LT primary	paddle rt lt tri	lt wound necrosis major, rt healed
lazy s	primary	paddle	bil flap necrosis major
transverse	primary	trimming	nil
lazy s	lt ETFL	paddle	rt major wound necrosis lt marginal medially
transverse	NA	trimming	wound necrosis major
rt lazy s lt transver	primary	trimming	RT wound necrosis major lt healed
lazy s	primary	trimming	bil wound necrosis major
transverse	NA	trimming	marginal necrosis minor
transverse	NA	trimming	marginal necrosis major
transverse	NA	trimming	wound necrosis major
transverse	na	trimming	nil
transverse	na	trimming	minor wound necrosis
transverse	primary	trimming	nil
transverse	primary	trimming	minor wound necrosislt, rt healed
transverse	primary	trimming	major wound necrosis bilateral
transverse	primary	trimming	nil
transverse	RT TFL, LT primary	paddle	nil
transverse	LT TFL,RT primary	paddle	rT wound necrosis
lazy s	RT ETFL, LT primary	paddle	NA
lt transverse RT la	RT ETFL, LT primary	padde	lt healed, rt marginal necrosis
lazy s	rt primary, lt ETFL	paddle	rt wound necrosis lt marginal medially minor

management	wound c	post	adjuv	healing time		delay in adjuvant	cause of delay
wound care	nil	neg	nil		20	…..	
wound debridement	ndary intention			76			
nil	primary intention				15		
nil	primary i	rt nc	RT	20 days		nil	nil
wound debridement	primary i	nod	nil	LT30 days,RT15 days		…..	
nil	primary intention				15		
wound debridement	seconda	nod	nil		90	…..	
wound debridement	seconda	nod	nil		74	…..	
wound debridement	seconda	nod	nil	25 days		…..	
wound debridement	seconda	nod	nil		65	…..	
nil	primary i	nod	nil		15	…..	
wound debridement	seconda	bil-n	RT	154 days		yes -6 months	wound infection
wound care	primary i	nod	nil		25	….	
rt wound debridement	lt primary	LT r	RT	LT-15 days, RT 64 da		4 months	wound necrosis RT
lt wound debridement	rt primar	bil p	RT	rt-14 days, LT- 54 days			wound necrosis lt
lt wound debridement	rt primary , lt secondary						
wound debridement	seconda	nod	RT		75	yes -6 months	wound infection
primary	primary i	nod	nil	15 days		na	na
wound debridement	seconda	nod	RT	LT-150,rt-365		yes1 year	wound infection
wound debridement	seconda	nod	nil		45	nil	na
rt wound debridement	SSG	nod	RT	rt -90, lt-12		yes-102	wound infection
wound debridement	ssg	nod	RT	bil-120		yes -120	wound infection
wound care	primary i	nod	rt		27	yes-45	minor necrosis
wound care	seconda	nod	rt		56	yes-60	minor infection
wound debridement	SSG	nod	chem		50	60	minor wound infection
nil	primary i	nod	nil		16	nil	nil
dressing	seconda	nod	RT		45	yes-60	wound infection
na	primary i	nod	salva		10	na	nil
na	primary i	nod	RT	15 days		nil	nil
wound debridement	seconda	nod	RT	150 days		6 months	wound infection
nil	primary i	nod	RT		15	nil	nil
care	primary l	nod	nil	RT-12, LT-10		nil	nil
rt wound debridement	lt primary	nod	rt	lt-15 days, RT 42 day		yes 60 days	rt wound infection
NA	NA	NA	NA	NA		NA	NA
wound debridement	RT seco	nod	RT		45	60	wound necrosis
wound debridement	seconda	nod	RT	LT-150,rt-365		yes1 year	wound infection

reaction to RT	complication	complicatio	complication	post op death	last follow u
xxxx	grade 1 lymphedema			nil	
				nil	
				nil	
moist reaction				nil	
xxxx	grade 1 lymphedema			nil	
				nil	
xxxx				nil	
xxxx				nil	
xxxx	grade 2 lymphedema			nil	9/20/2009
xxxx	nil	seroma- 25		nil	1/23/2009
xxxx	grade 1 lymphedema	seroma- 15		nil	8/18/2009
wet reaction	grade 2 lymphedema			nil	########
xxxx	nil			nil	defaulted
nil	grade-1 lymphedema				6/1/2010
unknown	na	na		defaulted	na
na	grade 1 lymphedema	na		nil	8/3/2008
na	grade 1 lymphedema	seroma-20		nil	########
na	nil			na	1/30/2010
na	nil				########
na	cellulitis lymphedema-2			nil	########
nil	seroma-34			nil	########
defaulted	nil	nil		nil	9/23/2010
defaulted	na	na	na	nil	9/11/2007
na	grade 1 lymphedema	na	na	na	########
nil	grade 1 lymphedema	na		nil	defaulted
nil	grade 1 lymphedema	nil		nil	18/11/10
reaction treatment brea	nil	nil		nil	30-9-2009
reaction treatment brea	grade2 lymp[hedema	nil		nil	26-8-2010
nil	nil	nil	nil	nil	18-3-2009
nil	nil				3/14/2005
nil	grade 1 lymphedema	seroma-30			defaulted fo
NA	na	DVT died 4		NA	
nil	na	seroma-16		na	########
na	grade 1 lymphedema	seroma-20		yes	########

disease status

NED
NED
NED
PD

PD

na
ned
ned
ned
ned
ned
ned
PD
unknown
ned
unknown
pd
ned
NED
ned
unknown
or RT
died of PE 4 pod
unknown
ned

Name	Age/Sex	CD No	Disease	Surgery	Dissection	Bil/Uni
Gowriammal	59/f	1531/07	ca vulva	M.R.V	inguinal	bilateral
Vimala	50/f	1922/08	ca vulva	M.R.V	inguinal	bilateral
tamilarasi	48/f	1506/07	ca vulva	M.R.V	inguinal	bilateral
kural murasu	37/m	1012/10	ca penis	emasculation	ilio inguinal	bilateral
sundaram	59/m	154/10	ca penis	emasculation	ilio inguinal	bilateral
venkatasamy	60/m	282/04	ca penis	partial penectomy	rt ilio inguir	unilateral
rajalakshmi	30/f	539/04	ca vulva	M.R.V	inguinal	bilateral
munusamy	33/m	1467/04	ca penis	partial penectomy	ilioinguinal	bilateral
bhavani	18/f	398/06	merkel cell ca	wide excision	ilio inguinal	unilateral
adhikesavan	50/m	1242/10	SCC RT foot	amputation	ilio inguinal	unilateral
annalakshmi	67/f	1432/07	ca vulva	M.R.V	ilio inguinal	bilateral
elumalai	84/m	747/09	ca penis	emasculation	ilio inguinal	bilateral
lingesan	48/m	1078/09	SCC groin	wide excision	ilio inguinal	unilateral
vadamalai	45/m	1077/07	melanoma foot	wide excision	ilio inguinal	unilateral
kannan	36/m	938/10	ca penis	partial penectomy	ilio inguinal	bilateral
Ramasamy	70/m	887/10	ca penis	emasculation	ilio inguinal	bilateral

Incision	if bilateral other side	skin excision	wound complication	management
lazy S	Bilateral TFL	paddle of skin	nil	care
lazy S	Bilateral TFL	paddle of skin	nil	care
transverse	LT TFL,RT primary	paddle LT, rt trimming	rt wound necrosis	rt wound debridement
transverse	RT TFL, LT primary	paddle	lt wound dehiscence	lt wound debridement
transverse	RT TFL, LT primary	paddle rt lt trimming	lt wound necrosis	lt wound debridement
lazy S	nil	paddle	nil	care
transverse	RT TFL, LT primary	paddle	nil	care
transverse	LT TFL,RT primary	paddle	rT wound necrosis	rt wound debridement
lazy S	rt TFL	paddle	nil	nil
transverse	RT TFL	paddle	nil	nil
lazy S	Bilateral TFL	paddle	nil	nil
lazy S	Bilateral TFL	paddle	compartment syndrom	Suture removal
transverse	nil	paddle	nil	nil
transverse	nil	paddle	nil	nil
transverse	lt primary	paddle lt trimming	lt wound necrosis	wound debridement
transverse groin	RT TFL/ LT primary	trimming	wound necrosis LT mi	wound debridement

wound cover	post op HPE	adjuvant therapy	healing time	
primary	node positive	RT	15 days	
primary	node positive	salvage surgery	15 days	
lt primary, rt secondary	LT node positive	RT	LT-15 days, RT 64 days	
rt primary , lt secondary	bil positive	RT	rt-14 days, LT- 54 days	
rt primary , lt secondary				
primary healing	node positive	salvage surgery	RT-10 days	
primary healing	node negative	nil	RT-12, LT-10	
lt primary , rt secondary	node positive	rt	lt-15 days, RT 42 days	
primary	node negative	salvage surgery	Rt-12	
primary	node negative	nil	RT-14 days	
primary	node positive	RT		13
na	na	na	na	
primary	node negative	salvage surgery		15
primary	node positive	NA		15
rt primary , lt secondary	node positive	RT	50 lt rt 15	
primary intention	node negative	nil	LT30 days,RT15 days	

delay in adjuvant defaulted here	cause of delay	reaction to RT	complication	complicatic	complicatic
			grade 1 lymphedema		
4 months	wound necrosis RT wound necrosis lt	nil	grade-1 lymphedema		
no	nil	nil	nil		
nil	nil	nil	nil		
yes 60 days	rt wound infection	nil	grade 1 lymphedema	seroma-30	
nil	nil	nil	nil	nil	
nil	nil			seroma-17	
nil	nil	nil	nil	nil	
na	na	na	renal failure	DVT	PE
na	na	na	nil	seroma-45	nil
na	na	na	grade 1 lymphedema	nil	nil
60	wound necrosis in lt	na	grade 1 lymphedema	seroma 45	nil
…..		xxxx	grade 1 lymphedema		

post op death	last follow up	disease status
	defaulted	unknown
	7/3/2009	NED
	6/1/2010	PD
	8/31/2005	unknown
	3/14/2005	unknown
	defaulted for RT	
	11/28/2009	NED
		NED
nil	10/12/2008	ned
yes-12	NA	died
nil	19-11-2009	ned
nil	31-6-2007	unknown
nil	23-11-10	ned
nil		

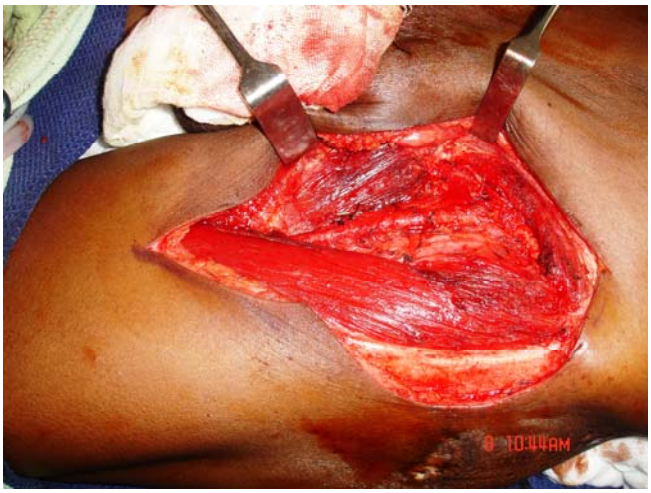
COMPLICATIONS

LYMPHEDEMA

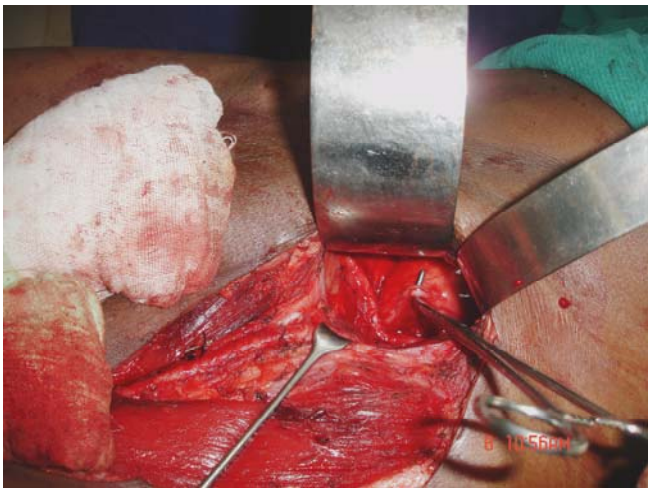
SEROMA

MAJOR WOUND NECROSIS

SURGICAL PROCEDURE



ILIAC DISSECTION



SARTORIUS TRANSPOSITION

TYPES OF INCISIONS

LAZY S WITH SKIN EXCISED

LAZY S WITHOUT SKIN EXCISED

DOUBLE TRANSVERSE INCISION

WOUND HEALING

NECROSED PRIMARY/HEALED STANDARD TENSOR FASCIA LATA

HEALED MODIFIED TENSOR FASCIA LATA

HEALED BILATERAL PRIMARY CLOSURE

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